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THE POPULATION PROSPECT IN RELATION TO THE WORLD'S AGRICULTURAL RESOURCES*

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Many years ago, Ruskin, the famous English art critic, began his beautiful essay entitled, "Unto This Last" with the words—"There is no wealth but life." I was reminded of this profound truth some twenty years ago when I passed thru an abandoned mining camp in Colorado—handsome sandstone buildings, stores, schools, churches, residences, with not an inhabitant in the empty, ghostly town—if you could call it a town. Again twelve years ago, during the economic depression, while riding up Fifth Avenue in New York City with a friend who was a vice president of the Irving Trust Co., I was reminded of Ruskin's words. This friend pointed to one skyscraper and remarked, "It is 25 per cent occupied," then to another enormous building that was 30 per cent occupied, then to the Empire State Building remarking that it was the cupola on the top that saved the owning company from bankruptcy. Finally, with a wave of his hands, he said, "They will all be empty shells some day." He knew of the decline in births, and that ten adults in our cities were rearing only seven children. He also knew that the long-time trend in births was downward. There is no wealth but life.

Tonight let us consider first how narrow are the physical limits that permit the existence of life, and then how important it is to preserve the social conditions that promote the continuity of human life.

THE PHYSICAL LIMITS OF CROP PRODUCTION

The two essential physical conditions are warmth and water. Persistent life is inconceivable at temperatures below 32°, where

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water freezes, or above 212°, where water turns into steam at sea level pressure. This is a span of 180°, as compared with a range of probably 12,000 or more degrees between absolute zero and temperatures on the sun. In all likelihood, the other planets in our solar system are too cold or too hot for the existence of life; and, on the earth, the duration of sufficient warmth in the air is too brief to permit the production of crops over large areas surrounding both poles. Life is found in the polar waters, where currents carry heat from warm areas nearer the Equator, but not much life is found on the lands beyond the Arctic circles. On the other hand, there is no part of the earth's surface too hot for life, provided there is water available.

About twenty years ago, we made a series of maps showing the acreage in wheat by minor civil divisions in all countries of the world. We are now engaged in preparing a similar series of maps, not only for wheat, but also for all other important crops, based on data for the years just before the war. These maps are not yet available, but we find that the changes in producing areas indicated by the later data are not great. The major regions of agricultural production are well established, and compared with the total land surface of the earth these are surprisingly small. The world has been settled; it will now be resettled. But this resettlement will consist mostly of changes in size of farms, hence in farm population; changes in crop production per acre with increasing use of fertilizer in some areas, and increasing losses by soil erosion in other cases; changes in markets for farm products and in trade routes. The pioneer belts of the future are as likely to be found near the cities as on the frontiers of settlements. The world map of land utilization, in its main features, is established for many decades, if not centuries, to come.

I regret I do not have maps of crop land, pasture land and forest land to show you, but the wheat maps we made some twenty years ago will serve fairly well to indicate the cold margin and the dry margin of crop production. These wheat maps were consolidated into the map I have hung on the wall (Fig. 1). It is true that barley and probably oats can be matured where the summer season is a little cooler or a little shorter, or both, than that required by wheat,—say 48° or 49° mean summer (June, July, and August) temperature for the extreme outer limits of barley and 52° or 53° for oats, as compared with 57° for wheat. But practically, in both

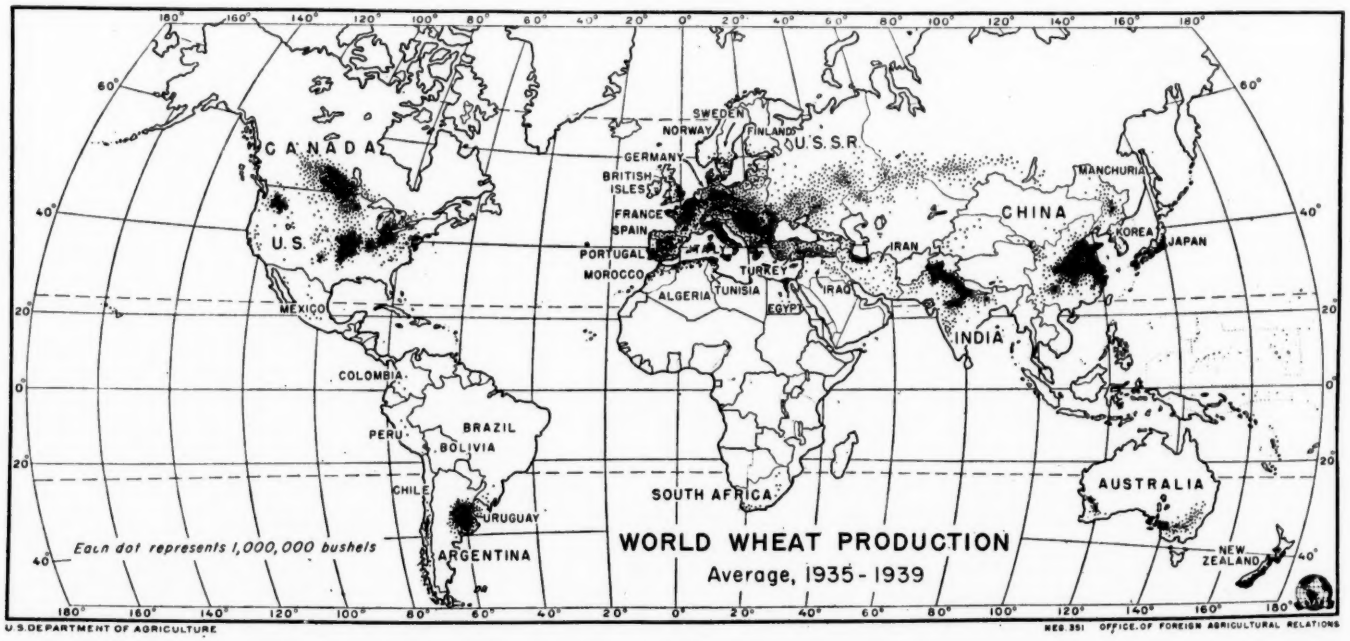

FIG. 1. Distribution of wheat production. The expansion of wheat production onto the grasslands of the western United States and eastern Europe, of Argentina and Australia, made possible by the invention of well-drilling apparatus, the steamship and railroad and modern farm machinery, resulted in the growth of cities and a new industrial civilization.

northern Canada and northern U.S.S.R., these three grains, and rye also, cease to be produced, except in minute quantities, where the mean temperature for the three summer months falls much below 57°. If population pressure in the U.S.S.R., where it is far more severe than in the United States and Canada, continues to increase, it is possible that the production of barley particularly may be pushed further north, to supplement the use of the land for hay and pasture; but industrialization and the growth of cities in the U.S.S.R. has already induced a decline in the farm population.

The arid margin of crop production is not so sharp or so stable as the cold margin. But here, too, altho barley can be matured under somewhat drier conditions than wheat, practically the margins of cultivation of these crops coincide, except along the northern edge of the Sahara in North Africa, and here the differences are not great. This arid margin of wheat production cannot be correlated with a single figure of annual or seasonal precipitation, for it varies with evaporation, hence with temperature and wind, with torrential or gentle character of the rainfall, as well as its seasonal distribution, and with other factors. In the Great Plains region of North America, it increases from 10 to 11 inches annual precipitation in southern Alberta to 22 inches in southern Texas.

Wheat, or barley either, has no heat limit in the world, for both are grown under irrigation in the hottest deserts of California and Mesopotamia. But neither are grown where heat is combined with high humidity, probably because of the greater severity of fungous diseases. In India, only a little wheat is grown where the average annual rainfall exceeds 50 inches, and almost none where it exceeds 70 inches. In humid eastern India rice replaces wheat. Practically all of the tropical rain-forest region is too humid for the profitable production of wheat. This is the rice region of the world, but rice occupies only a small proportion of the land.

The area too cold for the production of wheat, and practically all other crops except hay, is about 11 million square miles, or one-fifth of the earth's surface (see Fig. 2). The area having sufficient warmth but too dry for wheat, and for practically all other crops, is about 20 million square miles, which is nearly 40 per cent of the surface of the earth. Nearly two-fifths of the land surface

of the world is desert, much of which, however, is used for sparse grazing of cattle, sheep, and goats.

In about one-fifth of the surface of the earth the climate is too humid for producing wheat. Of this one-fifth, about one acre in thirty five is in rice. This leaves 10 million square miles, or a little less than one-fifth of the earth's surface, that is climatically suited to wheat.

But much of this land climatically suited to wheat is too mountainous or hilly for its profitable production, particularly in com-

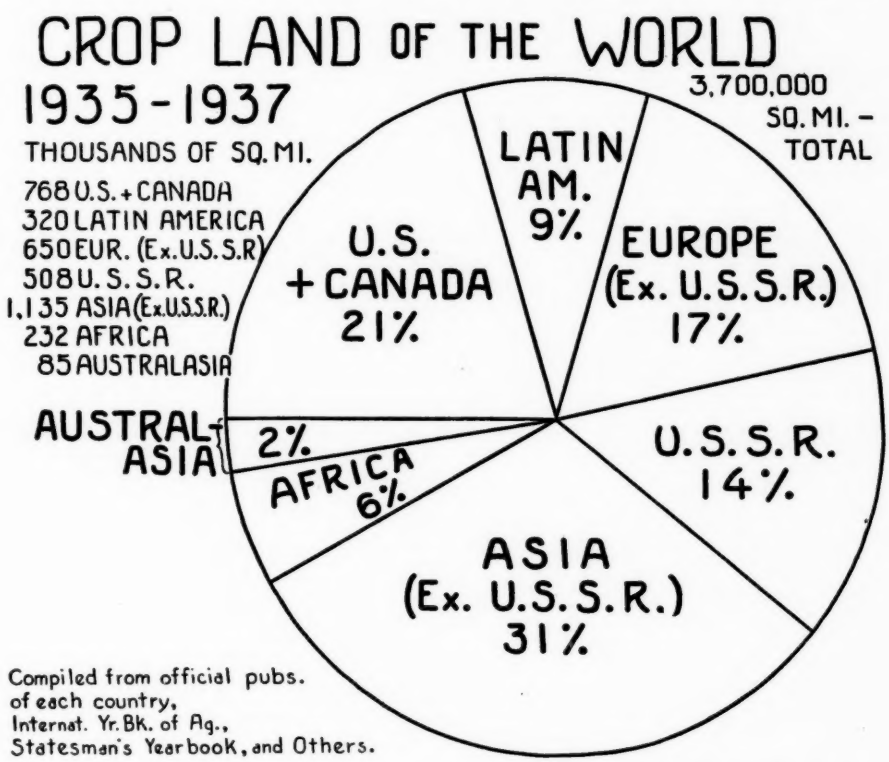

FIG. 2. Crop Land of the World (1935-1937). The 2% shown in circle just above Africa denotes Australasia. 3,700,000 sq. mi.—total. Thousands of sq. mi., 768 U.S. + Canada, 320 Latin America, 650 Eur. (Ex. U.S.S.R.), 508 U.S.S.R., 1,135 Asia (Ex. U.S.S.R.), 232 Africa, 85 Australasia.

mercial systems of agriculture in which modern machinery is used. How much land is thus topographically unavailable for wheat can be only guessed at, for it depends upon systems of farming, use of machinery, price of wheat, and other factors. But judging from studies made in the United States, I guess it may be as much

as 4 million square miles, or about one-third of the land climatically suitable.

Lastly we must consider the soil, for gravelly and sandy soils, unless greatly modified by man, cannot be profitably used for wheat. Such soil conditions probably characterize from one-tenth to one-fifth of the land climatically suitable for wheat.

Thus it appears that about 5 million square miles, or one-tenth of the land surface of the world is available for wheat production.

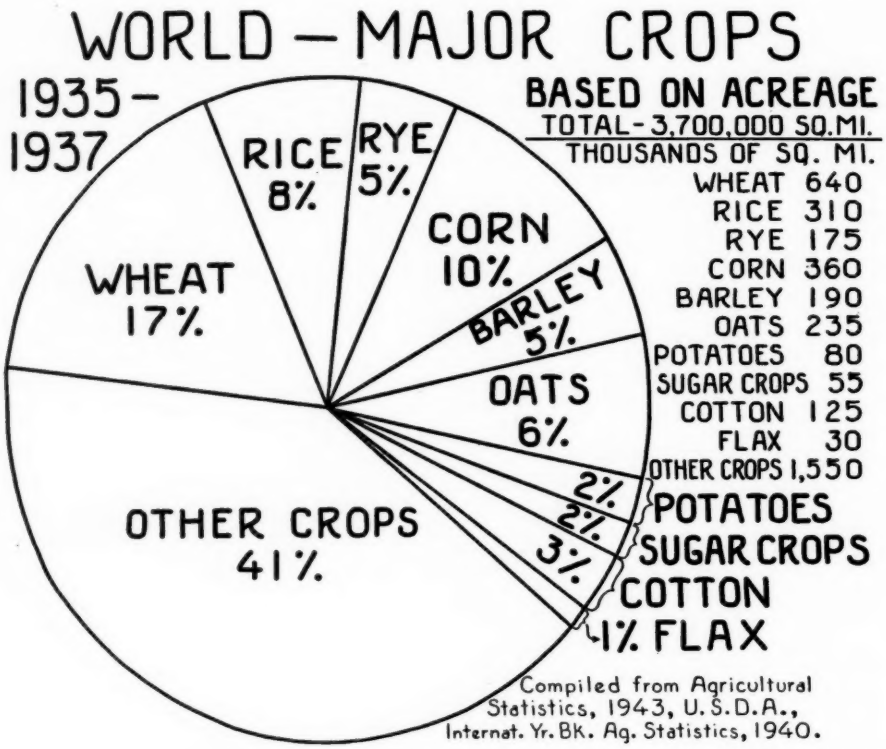

Fig. 3. Major Crops of the World (1935-1937). Based on Area. Total, 3,700,000 sq. mi. Thousands of sq. mi.: Wheat 640, rice 310, rye 175, corn 360, barley 190, oats 235, potatoes 80, sugar crops 55, cotton 125, flax 30, other crops 1,550.

Of this 5 million square miles, about 640,000 square miles, or one-eighth, was in wheat in the years just before the war. Part of the other seven-eighths is in other crops and part is in pasture or forest.

The total area in other crops is about 3 million square miles, using the statistics in the Yearbook of the International Institute

of Agriculture and the official reports of the various countries. Apparently the total crop area of the world, excluding summer fallow, just prior to the war was close to 3,700,000 square miles. Cereals occupy a little over half the crop land of the world (Figs. 2, 3, 4).

The question remains, how much land in the world is suitable for crops other than wheat. Wheat was selected as the major criterion of the potential crop area of the world because it was the

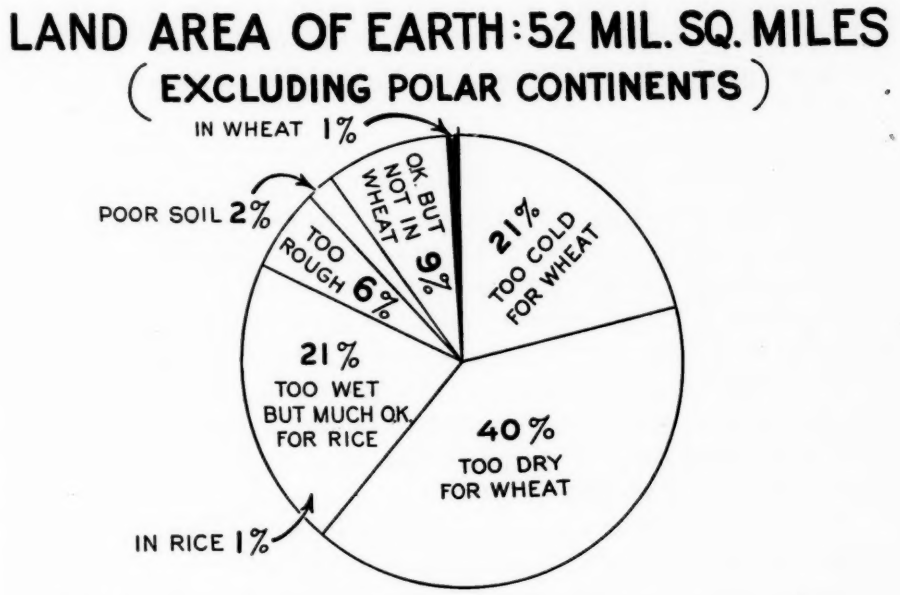
LAND AREA OF EARTH: 52 MIL. SQ. MILES
(EXCLUDING POLAR CONTINENTS)
IN WHEAT 1%
POOR SOIL 2%
OK. BUT NOT IN WHEAT 9%
TOO ROUGH 6%
21% TOO COLD FOR WHEAT
21% TOO WET BUT MUCH OK FOR RICE
40% TOO DRY FOR WHEAT
IN RICE 1%

FIG. 4. Land Area of the Earth: Fifty-two million square miles, excluding Polar Continents. Probably arable area could be increased 50 percent by use of machinery and fertilizer.

most widely produced crop, because it is grown practically as far toward the cold limits of crop as any other crop, except hay, and as far toward the hot limits as any crop; and as far toward dry limits as any other crop, except barley and the sorghums, which exceed it in drought resistance only slightly. But it is not grown as far toward the moist limits of crop production as many other crops, of which rice is by far the most important. To complete our estimate of the potential crop land of the world, we should know how much land not suitable for wheat is suitable for rice, and likewise how much not suitable for wheat is suitable for hay.

For hay, I am willing to make a rough guess that such area does not exceed one million square miles, and I doubt if it is half that amount. But for rice, we do not have adequate information concerning the humid tropical lands of the world, particularly the lands in southeastern Asia and the East Indies, in Central Africa and in the Amazon Basin of South America. If we assume that such area is as great as that already used for rice, it would increase the acreage by only about 300,000 square miles. I am of the opinion, therefore, that the 5,000,000 to 6,000,000 square miles estimated as potentially available for wheat and other crops with similar climatic requirements should not be increased by more than one million square miles to include land potentially available for hay and rice also.

I offer, therefore, as a tentative estimate of the lands of the world physically suitable for crops, not only those now used for grazing but also those which may be cleared of forest growth, irrigated or drained, as 6,000,000 to 7,000,000 square miles. Viewed realistically the smaller figure appears the better.

Of these 6,000,000 square miles about 3,700,000 square miles, or about 60 per cent were in crops just before the war. In addition to the 3,700,000 square miles in harvested crops, there were about 350,000 square miles of crop failure, summer fallow and arable land lying idle or not sown. Two-thirds of the area of such failure, fallow and idle were in the U.S.S.R.

It appears, therefore, that a little over 4 million square miles of the six million square miles physically available for crops were in crops, or in crop land lying idle or fallow, during the years just before the war. In other words, the crop area can be expanded by 50 per cent, more or less. But it should be realized that in all likelihood the best land is already in use for crops, and that much which remains unused is too dry, too wet, too hilly or stony, too light or too heavy for the successful production of crops in the present stage of agricultural technique or at the present level of prices for farm products.

In the United States, studies based on county soils surveys and other data made for the National Resources Committee in 1934 indicated about 1 billion acres or about 1,600,000 square miles physically available for crop production. This is about 2½ times the area of crops at present—one-fourth the potential crop area of the world.

However, expansion of the crop area in the world as a whole, as well as in the United States, will be largely at the expense of pasture and grazing land, and of the best of such land. Altho the productivity of this land may be increased by shifting its use from pasture to crops, the net gain will be smaller. Indeed, if the breaking up of the sod exposes the land to erosion by wind or water, or both, as is generally the case, the short-time gain may be transformed into a long-time loss. This will be true also of much forest land in hilly regions cleared for crop production.

INCREASING CROP YIELDS PER ACRE

The greater opportunity to increase agricultural production in the United States, and, I believe, in the world as a whole, is not by expansion of the crop area as much as by increasing the yields per acre. Wheat yields in Denmark and the Netherlands, for example, exceed 40 bushels, whereas for the world as a whole the average is only 15 bushels per acre. The higher yields in northwestern Europe are not owing to superior soil, for much of the land of Denmark, Germany and the Netherlands is sandy, and some of this sandy soil is used for wheat. These higher yields in northwestern Europe are owing primarily to rotation of crops, including a legume with its nitrogen-fixing bacteria, to use of mineral fertilizers, including lime, of animal manure and of productive seed, especially of varieties resistant to disease.

Now, it is true that most of the wheat of the world in recent years has been grown in sub-humid and semi-arid regions where frequently deficient moisture renders rotation of crops and use of mineral fertilizers and animal manure or crop residues more difficult than in humid regions. It is also true that the soil resources in these drier regions of the world is being depleted not only by removal of the nitrogen and minerals in the wheat crop but also by bacterial oxidation of the humus and nitrogen in the soil and by wind erosion particularly. In these drier portions of the earth all we can expect is that progress in scientific technique will enable the farmers to maintain present crop yields. In the humid regions, wheat yields per acre could be doubled and probably farmers could produce these double yields at no increase in cost per bushel.

Moreover, most of the corn and rice crops of the world, which jointly produce twice as much food or feed as the wheat crop, are grown almost wholly in humid regions. When one recalls that the in-

troduction of hybrid seed has increased the crop of corn in the United States nearly 20 per cent in a few years, and that it is feasible to double the present average corn yield by use of mineral fertilizers and animal manure or green manure crops, it seems safe to say that the yield of the world's corn crop per acre could be doubled by widespread adoption of improved practices and that of the rice crop increased materially, especially by use of nitrogen fertilizer, which appears to be the limiting factor in nearly all experiments in China at least.

Taking the world's crops as a whole, I am willing to venture the opinion that if peace and the protection of life, liberty and property were established thruout the world, that scientific knowledge was made available to the world's farmers by vigorous and appropriate agricultural extension services, and that the governments of the world were able to make arrangements for the loan of capital to farmers at such rates of interest as exist for farmers in the United States, the world's crop yields per acre, taken as a whole, could be increased at least fifty per cent.

Combining the estimated fifty per cent potential expansion of the crop area, which does not mean as much as it appears to mean, with the fifty per cent increase in yields per acre, I deem it safe to estimate that the potential crop production of the world could be increased by 75 per cent. For the United States, a recent study made by the Federal Department of Agriculture entitled, "Our Food Potential," estimated that our food supply could be increased to nearly 2¼ times that supplied in 1943. This is a modest estimate. Agricultural production in the United States has increased 30 per cent in the last five years, despite a great decrease in farm labor and great difficulty in obtaining farm machinery.

Consumption of Food per Person

Let us turn now from the production side of the food problem to the consumption side. This has two major aspects—the number of people and the consumption per capita. First, let us note the differences in diet, particularly the resultant requirements for land.

Combining the United States and Canada, there are about three and one-half acres of crop land per person, of which about three acres are required for domestic consumption (Fig. 5). In the U.S.S.R., there are about two acres of crop land per capita, and in Europe, excluding the U.S.S.R., about one acre. China has only

half an acre per person, but many of these acres produce two crops a year. In Japan there is only a quarter acre of crop land per person. The difference between Japan and China is primarily in crop yield per acre; but the difference between the Orient and Occident is mostly assignable to diet, that is, diet has been adjusted to the food supply.

This adjustment consists principally in consumption of plant products directly in the Orient, with only a little meat or eggs on holidays for the masses of the people, and practically no milk;

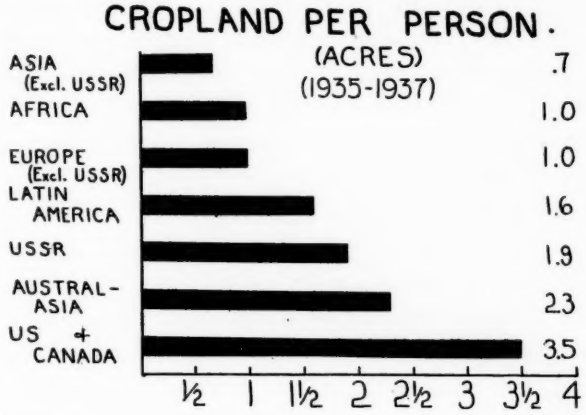

FIG. 5. Cropland per person. The vast range in ratio of population to resources is indicated by the one-fourth acre cropland in Japan compared with the three acres in the United States.

whereas in the Occident, particularly in the United States and Canada, meat, poultry, and dairy products constitute a large and very important portion of the diet. If man could live on sugar alone, only one quarter acre of sugar cane or sugar beets in the United States would provide the calories needed per person; and if man could live on corn alone, only two-thirds acre would be required; likewise of potatoes. Of wheat, because of the lower-yield, one and one-third acres would be needed. But when the corn is transformed into pork and lard, fully three acres are needed to provide adequate calories per person. The dairy cow, our most efficient transformer of feed into human food, requires less grain land than the hog, but more area in hay or pasture, neither of which products man can eat. Least efficient is the beef animal, which requires two or three times as much feed as the dairy cow to produce the same number of calories of food. Taking animal prod-

ucts as a whole, from three to four times as much land is required to produce the same number of calories as would be required if the cereals were consumed directly by man. But it should be noted that the meat and milk animals utilize pasture grasses and forage crops that man cannot consume directly; also that the animal products possess many nutritive values not contained in the crops.

The Population Prospect

Now let us turn from land and the potential food supply and from this very brief note on differences in diet, to the people of the world and their potential demands of food. In considering this population prospect, we must realize that there are three worlds and not one.

Prior to 200 years ago, there was one world, a world characterized, in general, by almost stationary population, the result of a high birth rate and an equally high death rate. Probably half the children died before they reached ten years of age, and half the population, probably, were under twenty years of age. Old people were few and their accumulated wisdom as to how to survive was highly respected. War, famine and disease ruled the world, as Malthus pointed out, and kept the number of people within the means of subsistance. The waste of life and wealth was colossal, and lead to a fatalistic philosophy, as among Mohammedans, or the hope of heaven in a world beyond the grave, as among Christians.

This ancient world still persists in large measure in the Orient, that is, in India, Indo-China, the East Indies, and China, where half the world's people live, also in parts of Japan and South America. Here population presses on the food supply, poverty and disease are dominant, a high birth rate and a high death rate tend to keep population more or less stationary. However, with introduction of sanitation and the transportation of food to drought-stricken areas, the incidence of disease and famine may be greatly diminished, as occurred in India between 1931 and 1941. During these ten years, population in India increased 50 million. This is an increase exceeding in number one-third of the total population of the United States, in a region with much less agricultural production. It is prophetic of the population prospect in the Orient.

In northwestern Europe, in most of the United States and in

the British dominions we have, on the other hand, what may be called the Occidental World. Here the birth rate has been falling for many decades and is now so low as to scarcely reproduce the race (Fig. 6).

The birth rate in the Occident, in all likelihood, will continue to fall. The death rate also is low, but must inevitably rise, be-

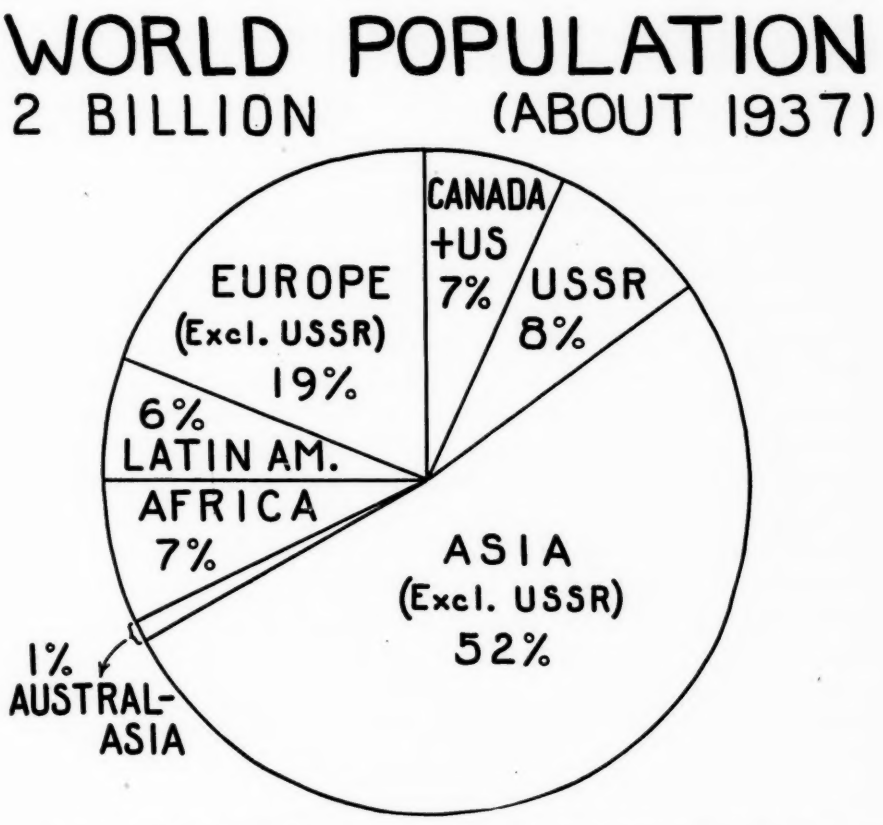

FIG. 6. World Population (About 1947). The population of the world was more than two billion just before the war, of whom a half lived in southern and eastern Asia.

cause of the increasing number of aged. For just as the number of births increased in the United States, for example, until 1921, so the number of aged will increase for about 75 years after 1921, or until nearly the year 2000. There will be fully 50 per cent more old people in the United States 25 years hence as there are today and fully twice as many 50 years hence. On the other hand, as the trend in number of births has been downward since 1921, so the

trend in number of potential mothers will be downward after about 1950, when we will have a maximum number of women in the middle of the child-bearing period. Even if the birth rate should cease to decline after 1950, the number of births will continue to decline because of the declining number of mothers.

In the United States, this prospective decline in population cannot well occur in less than 25 years, unless a war more devastating to us than World War II occurs; but population may be at its peak, or rather plateau, in 25 or 30 years. In northwestern Europe, on the other hand, the recent war has been so devastating that population may be declining already, and the loss in young men, as well as the decreased food supply, with associated increase in disease and death, affords little hope that the downward trend can be reversed, at least for a long time.

This modern Occidental civilization, with its rapid approach toward conquest of poverty and disease arising from the recognition of the dignity of human personality and the necessity of liberty of thought if science is to advance, is now facing the gravest dangers both from within and without. Within it is being weakened by the love of luxury and ease, and by decline in the integrity of the family as an institution for the reproduction of the race and the transmission of wealth and culture from generation to generation. Without it is threatened by a very efficiently organized group possessing different values than ours as to right and wrong associated with an even more materialistic philosophy than ours; also, strangely, with a religious conviction which makes a strong appeal to the masses of Eurasia who will increasingly feel the pressure of population on the natural resources. If the masses do not feel this pressure now, this group of leaders will make sure that they feel it in the future.

The third world may be called the Transition World, or it might be better to call it the Intermediate World, for all three worlds are in transition. This Intermediate World includes the U.S.S.R., and in less degree, much of southern Europe and urban South America. It is characterized by a high birth rate, the heritage of the oriental or ancestral origin, and a lowering death rate arising from its contact with occidental civilization. Despite the ravages of war, its population is increasing, and this increase probably will accelerate. Dr. Notestein, of Princeton University, a careful worker in the population field, estimates that the popula-

tion of the U.S.S.R. will increase by 75 millions in the next 25 years.

The birth rate in the U.S.S.R. is falling, in all probability, particularly in the cities; and almost certainly will continue to fall with the progress of industrialization, for everywhere the development of industry and the urbanization of people diminish the birth rate. But the death rate, at least before the war, was falling much more rapidly, and doubtless will continue to fall faster than the birth rate for perhaps a century to come. We must remember that altho industrialization and urbanization diminish the birth rate, probably eventually below the permanently reproductive level, as in northwestern Europe (except the Netherlands) and the United States, the immediate effect is a rapid increase in population, because of the progress of sanitation and the progressive conquest of poverty and disease. England, for example, in 1800 had only about 8 million people, in 1900, nearly 4 time as many. If the U.S.S.R. increases in population even at a much less rapid rate, and at present this seems reasonable, the Russians will be numerous as the Chinese are now within a century.

How numerous will the Chinese be then? No one knows, of course, but so eminent a student of population of trends and natural resources as Dr. Thompson, of the Scripps Foundation for Research in Population Problems, thinks it entirely possible that the number of Chinese may double during the next century.* China,

* Thompson (Warren) in "Population and Peace in the Pacific," University of Chicago Press, 1946, pages 182-183, says:

"The basic point for our argument is the simple statement which no one will dispute —that China has a huge population, almost certainly not less than 350 million and possibly in excess of 450 million. A second statement which no one at all familiar with living conditions in China will doubt is that the possibility of growth for several decades to come will be measured by the extent of the control achieved over the death rate, since the birth rate will remain high and will vary within rather narrow limits. The rate of growth for some decades to come might, therefore, easily equal and might well exceed that of Europe after 1800, if a strong, unified China were in a position, now that the war is over, to improve public health, to establish irrigation projects, to extend the tilled area by mechanized farming in regions of light rainfall, to build railroads and roads, to industrialize. All of these improvements are confidently expected to come rather quickly, both by many Chinese and by many foreigners. A natural increase of only 10 per 1,000 per year in a population of 350 million would mean an increase of over 36.5 million in a decade, while a natural increase of 15 per cent in a decade, such as prevailed in India (excluding Burma) during the decade 1931-41, would raise this to about 56 million. An increase of about 25 per 1,000 per year, such as now prevails among the Chinese in Formosa, would raise the numerical increase to about 98 million.

It must not be forgotten that in China we are dealing with numbers so much greater than those in the West that we are likely to under-estimate potential future growth.

including Manchuria, has the coal and many other minerals adequate for a much greater industrial development than Japan attained before the war; and China can import iron ore, if needed, quite cheaply from India. In coal resources, China ranks next after the United States and the U.S.S.R.

India also may double in population in the next century. It has both coal and iron ore; not as much coal, but more iron ore than China. The largest steel mill in the British Empire is in India, and it is owned mostly by native capitalists. India, like the future China, can exchange industrial products for food from Burma, Siam, the East Indies, even Australia. Undoubtedly also, India can increase its own food supply materially.

In both India and China the substitution of the small garden tractor for cattle in the cultivation of the land would release enormous areas of land to produce food for human use. India has 160 million cattle, more than twice as many as are in the United States. The substitution of gasoline for horse feed has already released fifty million acres of land in the United States for other uses, mostly food production. A horse in the United States requires more food than a man. Undoubtedly a cow in India eats much less than a horse in the United States, but it is doubtful if the difference is any greater, relative to land required, than between a man in the United States and a man in India. In India, there are about two-thirds of an acre of food and feed crops per person, in United States two and one-third acres—a two to seven ratio. That 160 million cattle, not used for meat except by the Moslems, producing very little milk, and very inefficient in production of power, are kept by a people having only two-thirds acre of crop land per capita is unbelievable. Yet such is the fact. Whether the people of India will become sufficiently practical, if not rational, to cease to breed these myriads of cattle and buy instead garden tractors,

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For China to add to its numbers in a single decade as many people as there are in France, or in the United Kingdom, or even in Germany would not require a rate of increase greater than that which has prevailed in many parts of Europe for relatively long periods during the nineteenth century and significantly less than that in much of the New World during that time.

It is not fantastic to contemplate such a population growth in China in the light of what we have already found happening in the Japanese Empire and what we shall find below regarding the actual population growth in Southeast Asia during the last several decades. We must face the fact that China will almost certainly grow by 40-60 million in each decade as soon as a few relatively simple economic and political changes are made.

whose cost of operation would be much less, only the future can reveal. I surmise the food supply of India could be increased 50 per cent or more by such a change.

The population of India has doubled since the first census was taken in 1871, despite famine and pestilence that held population practically stationary during three of the seven decades. With continued improvement of transportation facilities and other controls over famine, and with advancing sanitation and other controls over disease, a doubling of the population appears not unlikely during the next century, provided an adequate food supply becomes available, and this seems entirely possible.

THE PROSPECT AND SOME IMPLICATIONS

This, then, is the prospect as I see it: Looking forward a century —and a century is not long in the history of nations—twice as many people in the Orient as today, of whom probably a few, perhaps many, will have attained a comfortable level of living; but most of whom, doubtless, will be perpetually hungry as they are today. Undoubtedly great industrial development will have occurred, much greater than that in Japan before the war, for China and India possess far greater resources than Japan.

In the U.S.S.R. and its satellite states, probably 400 to 500 million people, two-thirds or more living in cities, and population possibly stationary. Industrialization will probably by that time have exceeded the present American level.

In Northwestern Europe, only a relatively few descendents of the present population, and if these lands have not been conquered by war, they will have been altered by the peaceful penetration of peoples from the East. For, as Kuczynski, of the London School of Economics, points out, so rich a land as England would not be permitted to decline to one-third its present population, as would occur in little more than a century should the low birth rate before the war persist, without inviting immigration or invasion from outside.

As to the population of the United States 100 years hence, we can only guess. But we know that if the trend in the birth rate during the past century persists, and no immigration occurs, the population will be much smaller than it is today. Can 100 million people, let us say, living in relative luxury and with an abnormally high proportion of aged persons, keep out 1 to 2 billion people in

the Orient possessing an industrial power many times greater than that at present? On the other hand, across the Atlantic, a new Europe, probably consolidated by that time under one government, may well have a billion people, half or more Russian. The birth rate in the U.S.S.R. is still almost as high as in the Orient—around 40 per thousand in population—while the death rate is falling rapidly. If it required 100 years of industrialization in the United States to bring the birth rate down to the reproductive level, and probably 140 years will be required to reach a stationary population, ten times as large as when industrialization started, is it not likely that population will continue to increase in the U.S.S.R. for a century, and may increase two or three fold in that period.

Thus the United States faces across the Pacific Ocean a familistic culture, whose ideals and institutions will be slow to change, and whose birth rate, therefore, will decline only slowly. These Oriental peoples need only an increasing food supply and the introduction of modern sanitation to double in population every few decades. That their numbers will double in a century appears a reasonable estimate, for the use of nitrogen and mineral fertilizers, the control of plant diseases and the substitution of gasoline for animal feed can probably double the food supply without expansion of the arable area. Moreover, the oriental people by that time will be largely industrialized, partly commercialized, youthful in age distribution of population and vigorous, and probably no less resentful then than now of an immigration policy in the United States that excludes them from land which we ourselves are not utilizing.

And across the Atlantic Ocean, our nation will probably be facing a united Europe, with a population perhaps ten times our own, also industrialized, perhaps nationalized, youthful and vigorous, unless the Russian people lose their present attitude and customs, and probably as resentful against our immigration policy as the Oriental peoples.

A people who do not care to have children will gradually cease to exist, and other peoples with greater love of life and children, with more thought to the future and greater sense of responsibility, cannot be blamed if they press into the partial vacuum. Let us hope that this penetration will be peaceful. Perhaps, by that time it will be welcome, as it was a century ago.

DEVELOPMENTS IN THE FIELD OF GEOGRAPHY AND THEIR IMPLICATIONS FOR THE GEOGRAPHY CURRICULUM*

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The skills and concepts normally included in geography are of particular and immediate importance. They always were of importance, but the experiences of the last five years have made more people aware of them. They are important for a very simple reason: a democracy survives only on the basis of an educated electorate; when a democratic people must adopt basic policies in a world of intimate international contacts, such a people must be able to think geographically or perish.

The strong isolationist sentiment which kept the United States from assuming its full international responsibilities in the period between the two world wars was, in itself, a form of geographical illiteracy—or perhaps it was the result of fears generated when people had to deal with issues they did not understand. Could it have been modified if geography had been wisely and effectively taught in the elementary schools? It is not impossible that the course of history might have been changed by two or three decades of effective geography teaching in American elementary schools.

It is hard for us to get the real feel of life in the Europe of Benvenuto Cellini. Very few of the people of Europe in that period ever went farther from home than the edge of the nearby forest or the rim of hills that formed the immediate horizon. When one city was having a famine, a neighboring city was enjoying plentiful supplies of food. When Cellini sets out from one city to travel to another one, he makes it sound as if he were going on a long journey. In communities of this sort geography could be a skill of chief importance to sailors or traders or statesmen; but as far as the average person was concerned, weird stories of strange places inhabited by monsters made better reading than any sober account based on realities.

About a century and a quarter ago the distance one could travel in a day began to increase—not just a little but tremendously. The

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railroad and steamship started it; the automobile and the airplane have in the last twenty years made journeys commonplace that would have been simply incredible even to our fathers and mothers. What people are doing in other lands, what they are afraid of, what their problems, are, what their economic or military power might be—these are no longer things that the public can afford to leave to a skilled few, these are now vital facts involved in the decisions we as a people must make if our way of living is to survive. Suddenly many people are aware of the enormous practical and immediate importance of the skills and concepts of geography.

Is the geographic profession ready to accept its responsibilities? We have talked about the importance of geography for many years: are we going to keep on talking about it while we fail to see that educational administrators, government officials, and even private business men are now ready to agree with us? Are we going to keep on arguing about what is geography, or how many pages in what magazine are required for election to what secret society, or whether man is silently and persistently influenced by nature or not? We have important things to do: we have to teach certain concepts that are essential to an understanding of the issues involved in present-day policy; and we have certain skills to teach that are essential to a real understanding of these concepts—that are essential to making the concepts something more than mere words.

Five Basic Concepts

What are the primary or basic concepts that need to be taught? We might suggest tentatively that there are at least five such concepts which are the basic principles concerning man-land relationships:

1. That all human societies are necessarily forced to establish workable connections with the resources and conditions of the land in order to survive.
2. That simple cultures have a few direct connections with the earth resources of their immediate locality, but that the more complex the culture the greater the variety of connections with the earth resources and the more indirect they become. For this reason they are not so easily perceived, and the principle that connections with earth resources must in fact exist on a permanently workable basis in order to insure survival is a concept that needs emphatic teaching.

3. That the most complex culture of all—the industrial society—by its essential nature is global in its scope and international in its needs. If it is to survive it must draw upon all the world's resources, and all the world's people must share its benefits. The fact that our nation now enjoys 49.8 per cent of the world's income should not be cause for joy, but of alarm because our way of living is dependent on the coordinated economic activities of distant people, and when these people have so small a share of the world's income, no real coordination is possible. This is the concept of "One World"—of one community of interdependent peoples, one society of internationally responsible states; it is the exact opposite of international irresponsibility, economic self-sufficiency, and isolationism.
4. That the significance of the features of the physical earth is determined by man and not by nature. That the regions of the world now occupied by the most complex cultures were once considered fit only for barbarians, and that changing technology can again change the whole resource pattern, the significance of the climatic pattern, the basic relation of man to the earth. This increases—not decreases—the importance of analyzing the present-day significance of earth features in relation to human societies. It makes geography an adventure in understanding, not an exercise in memory.
5. That the physical and human differences which exist from place to place on the earth are significant to us because the great economic, social, and political issues of our time are in part the direct result of these differences. It is important to know, for example, in what respects the Soviet Union, including its sector of the earth's surface, differs from other countries and places, not because such facts make good discipline for memory training, but because they are essential to the understanding needed in the formulation of our policy in the international world.

But in order to teach these concepts effectively, much more needs to be done than simply to state them. What is their relative difficulty? In what order should they be taught? Can they be taught by words alone, or is skill in map reading an essential method? At what stage in the curriculum is the child really ready to assimilate a fairly comprehensive account of the geography of any major part

of the earth? When can the child begin to understand the significance of these things?

In this audience we already know the answer to the question about maps. Without maps none of these concepts can be really grasped. The words may be learned, as they often are by school children, but the concepts are still vague and ineffective.

MAP READING

The development of skill in reading and understanding the complex symbolism of the map is, of course, the primary responsibility of geography. All the social sciences do, and properly should, make use of map-reading ability; but only geographical training develops competence to teach this definitely complicated subject. Yet, in spite of some five years of publicity given to the "new" global geography, the fact remains that more often than not maps are not taught at all, or if they are taught, the teaching is not done effectively. Studies, which need not be quoted here, show that there is an unpardonable proportion of failure on the part of pupils to understand maps.

When a map is placed before a student we must not assume any understanding of its symbols or any ability to read its message. The approach to the development of map-reading skill must come step by step, just as the reading of words and sentences is taught. A few suggestions along these lines may be offered.

We should begin with a very simple globe. Nothing but land and water should be shown. No grid of latitude and longitude lines should be shown, but the two poles and the equator should appear and should be prominently named. Such a globe, or pictures of it from various points of view, would serve to build up gradually the child's idea of relative size, shape, and position of the continents which will presently be named.

All the early approaches to flat maps should use the globe as a reference. All the first maps of area smaller than a hemisphere should appear to be enlarged portions of a hemisphere, shown in perspective and therefore with a curved horizon.

The showing of other features than just land and water should come gradually, not more than one or two at a time. For example, mountains and drainage features might be added together, but surely nothing else until these symbols have been mastered. Very early, and while still employing globes the child should be shown

that color can be used to present various kinds of data. Color means one thing on a vegetation map, another thing on a rainfall map, still another thing when applied to kinds of terrain. The use of color should be varied in order to avoid the impression that any one color always is used for the same phenomenon. Liberal use should be made of black and white maps. The child should be accustomed to the idea that gradations in black shading can in many instances present exactly the same data as those presented with color. Always, when colored or black and white symbols are used, the child's attention should be called to the legends again and again and he should be led to interpret them properly.

Very early in map training should come an attack on the idea that north is always at the top. The use of the words up and down to refer to north and south should be discouraged. The use of the globe-type projection makes this lesson easy in that north is not "up" on the map but only toward the north pole. Liberal use should be made of maps oriented in other directions than north. The child should become just as familiar with the configuration of North America when viewed from a point over the north pole as when viewed from a point over the equator.

THE GEOMETRIC ASPECTS OF MAPS

The geometric aspects of maps should be presented very gradually, and must be carefully and thoroly taught. With the first globes the poles and the equator can be shown. After a while the polar circles and the tropics can be shown, preferably when required by the study of polar or tropical lands. It is possible to use the terms low, middle, and high latitudes—identifying each as a band covering approximately a third of the distance between equator and poles. The use of these terms avoids the unsound connotations that have been built up around the Torrid, Temperate, and Frigid zones, but does provide a frame of reference by which to show the differences of climate between monotonously warm places, places with variable weather and great seasonal change, and places which are never warm.

Eventually parallels of latitude must be shown and when they are shown they should be fully explained. The much more difficult teaching of meridians can well be postponed as late as possible.

If children are to develop real map-reading skill it is essential that maps should be used repeatedly. Maps in the classroom should

not be left hanging on the wall like pictures of Abraham Lincoln, but should be pointed to and studied again and again. In texts there should be constant reference from the written material to the maps, and from map to map. There is no justification for using maps only to illustrate materials presented in words; actually the map can tell its own story—better than pages and pages of words. But the teacher must be aware of the need for drawing out the full meaning from each map.

At an early stage, maps should be taught also from the point of view of the locality rather than of the globe. The making of simple plans of classroom or of the neighborhood provides exercises of great value in mastering this subject. The child should be taught to orient himself by means of a map, and the points of the compass must be taught for this purpose.

GEOGRAPHY READINESS

When, we may well ask, can the teaching of the basic concepts and skills of geography begin? There is abundant evidence that geography is one of the many subjects of the elementary curriculum for which at least two and possibly three years of preparatory explanation and training are needed before children are ready to undertake any systematic work. This need has already been recognized in reading programs, for which several weeks, a few months, or even an entire first year is devoted to "reading readiness"; it has also been recognized in arithmetic, and in English. Geography readiness consists of much more than being up to grade in reading ability, altho this subject too merits much more study than it has received in the past. We also need to teach the meaning of geographical terms. We cannot expect third graders in Kansas to appreciate the meaning of *ocean,* or Florida children to understand the meaning of *mountains.* Even such simple things as river, lake, isthmus, island, mountain, hill, and plain cannot be assumed to form a part of the previously acquired equipment of the average stay-at-home child. Geography is full of technical concepts of this sort.

The basic concepts of geography—of man on the earth—are all dependent on an understanding of the significance of differences from place to place; and without an ability to read and understand the symbolism of the map, such differences can never really be used as a part of the thought process. It is vitally important that we geographers learn soon how to teach these things effectively.

TEACHING RESOURCE CONSERVATION THRU GEOGRAPHY*

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World events and national needs have forced upon us the necessity for natural resource planning. World War II levied a heavy toll on America's natural resources,especially those of the United States. If this nation is to hold its present world position and to continue the standard of living to which its people are accustomed, it will be necessary to inventory its natural resources and to plan their use with the greatest care. This is especially true of the renewable resources.

With the prospects of permanent world peace in view, it should not be necessary for any nation to aim at self-sufficiency. Such a program is unnatural and wasteful of resources. Scarce and nonrenewable natural resources are usually most abundant in limited areas of the world. Renewable resources are also better adapted to some areas than others. These should be encouraged where they can be produced profitably and with high quality, and should be available thru commercial channels to the rest of the world.

Only thru proper planning can the natural resources of a nation, or the world, be conserved and made to yield their greatest usefulness. Planning may be on a world basis, as in the case of the Food and Agriculture Organization of the United Nations. It may be on a national basis, as the soil conservation program of the United States. Actual working plans for the conservation of natural resources are usually made for smaller units, such as the community, farm, or home. Every individual must daily make decisions which result in either conservation or waste of resources.

Only thru proper education of the people at large can any plan or program of conservation be carried out effectively. A general attitude favoring conservation must be developed. In order to do this, people must have a knowledge of the importance of the various resources, and how they touch their own lives. They must have information regarding the supply of the natural resources and the possible results should that supply diminish or disappear. They need to have practical information, technical and otherwise, on how

* This paper was read at the annual meeting of the American Nature Study Society, Boston, Massachusetts, December 27, 1946.

to conserve or increase that supply. To be effective, the incentive to conserve must be on the basis of personal or group benefit, rather than patriotic service.

Conservation education is properly a function of public and private schools. They have the facilities for providing a broad education. We expect the schools to prepare young people for better living, and to take their place in the world of affairs. Conservation may become a way of life when intelligent conservation plays a part in every-day living.

It may be desirable to teach conservation of natural resources as a separate course at some level of the educational field, when it is used to summarize previous instruction, or to present the subject in a comprehensive manner. A separate course may be necessary to provide technical information in a particular field of conservation, on a vocational basis. A common criticism of the separate course is that it doesn't tie the subject matter up with functional living. Furthermore, the school curriculum is already filled with subject matter courses. Assuming that the present courses cover every phase of human life, and that natural resources enter into every-day living, it seems more logical to teach natural resources and their conservation thru present subject matter areas. This may be done thru units of instruction, or by integration wherever natural resources and their use or abuse occur in the subject area. In this way, conservation of natural resources is emphasized in every grade and the child becomes impressed with the fact that conservation is a factor in every-day living. However, such integration requires that every teacher be familiar with the subject matter and the techniques of conservation teaching. The teacher should have adequate training in both.

Geography is a school subject admirably suited to the teaching of conservation, since it deals with practically all of the natural resources. On the other hand, it is a subject which may become dull and uninteresting if it lacks the incentive to make the subject matter practical and important to the student. This is most certain to be the case if the subject is taught largely from books, and if the supplementary aids are limited to maps and occasional photographs. The inclusion of conservation may well supply the necessary incentive. However, the approach must be made thru the natural resources, their importance, and the need for conserving them. The student will then learn to look upon resources as valuable gifts of Nature,

and he will learn that Man is responsible for their proper use and future supply. Each resource becomes something which is necessary to him and his family, either directly or in manufactured form. The source of the supply, and whether the supply is adequate and permanent, becomes a matter of interest to him; he learns that he has a real stake in conserving the resource.

Few school subjects present greater opportunity for making the subject-matter real and instruction effective, than does geography. Many of the physical features of the earth can be studied in the local community. These features, together with the changes which take place thru the influence of water, wind, climate, man, and other agencies, may not be present on as grand a scale locally as in some other part of the world, but they are usually present in some form or other. Many natural resources occur locally or are produced in the community. These can be observed and studied in their natural setting. Of the resources which are not native to the community, it is usually possible to have specimens in the schoolroom, or they may be found in a museum nearby. Well-organized field trips are absolutely essential for effective instruction in this field. Nothing is so conducive to interest and understanding in regard to physical subject matter as to observe it first-hand, or to be able to feel, taste, or smell it.

The most effective way to teach conservation is to have the students practice it. This can probably best be accomplished thru group and individual projects. A project can be organized in the schoolroom to promote wise use and conservation of school furniture and supplies. Other projects may be organized to project to the schoolgrounds, the home, and the community. They may include the conservation of such resources as food, clothes, fat, paper, scrap iron, soil, water, and home and public equipment. Tree planting and wild-life projects are particularly appropriate. School and community forests, bird sanctuaries, and living memorials may offer the opportunity for participation. In all cases, the students should be encouraged to use initiative and to accept responsibility.

There are several kinds of geography. These provide a variety of interests and each has a bearing on natural resources and their conservation. Physical Geography treats of the physical features of the earth. It includes land and water forms, and how they came about; also topography, climate, and the changes which are constantly taking place, whether for better or worse. These physical

features have a great deal to do with the production and supply of certain natural resources. Political Geography treats of countries and their people. Political boundaries are unstable, as history shows. The stability of states and their boundaries are influenced greatly by their natural resources. They determine a nation's might and power. Industrial, Commercial, and Economic Geography deal with natural resources, and their extraction and production; also their conversion, fabrication, and distribution. Only thru proper conservation of our natural resources can individual, national, and world economy be maintained and kept sound.

PHYSICAL GEOGRAPHY

The place of conservation in physical geography should be obvious. We are interested in the physical features of the earth because of their influence on life and human activities. Oceans, mountains, lakes, canyons, and deserts are interesting and have varying degrees of importance. However, it is the soil and water and the life they support, and the minerals used by man, that are the most important physical facts of geography. Together with climate, these are the things that largely determine man's habitation and activities.

The exhaustible resources upon which man depends may be divided into two classes: renewable, and non-renewable. The non-renewable resources are found within the earth. They are the minerals consisting largely of the metals, rocks, and fertilizer elements; and the organic materials, coal, petroleum, and natural gas.

It is obvious that the supply of exhaustible, non-renewable resources is limited. The future supply depends upon present wise and careful use. Conservation of these resources consists of the least possible waste in extraction, conversion, storage, and consumption. The metals and some other minerals may be further conserved by careful salvaging and re-use. The supply of important metals can be prolonged by substituting products made wholly or partially from organic products, such as plastics, for certain purposes. The supply of coal, petroleum, and natural gas may also be prolonged by making greater use of other sources of energy. Water-power can be used to a much greater extent than is done at present. Wood and other vegetable matter may be used to a greater extent for fuel. Alcohol and other wood and vegetable extracts may some day substitute for gasoline. The wind has already been harnessed

for certain purposes. Perhaps attempts at harnessing the tides and the sun's rays will become successful when necessity demands it. However, the greatest potential source of energy for the future is atomic fission.

The renewable resources are numerous and important. With the exception of soil and soil moisture, they are of organic nature. The most important of these are trees, shrubs, grasses, legumes, other herbaceous plants, domestic, and wild animals, animal products, birds, fish, and other aquatic life. Recreational facilities in Nature and landscape beauty also include organic resources.

Soil and water are of fundamental importance to man, since all of the other renewable resources are dependent upon these two. Soil and water are the basic capital of any nation, and largely determine its security and welfare. Man depends upon the soil for most of his food, shelter, clothing, and other fiber. The quality of food depends upon the soil on which it was grown or produced. This applies to animal products such as meat, milk, butter, cheese, and eggs, as well as grains, vegetables, and fruits. The nutritive value of food depends not only on protein and carbohydrates, but also on vitamins and important minerals such as calcium, phosphorous, potassium, sodium, magnesium, iron, sulphur, copper, and many trace elements. If these are not found in the soil, they cannot be in the food.

Many of the present soils do not contain all the nutrient elements required in food. Some never did contain even the major mineral elements to make them fertile. Many more lack the necessary trace elements. Nitrogen is commonly deficient in sandy soils. Phosphorous, as well as nitrogen, is deficient in most acid soils. Practically all muck and high-lime soils, and most sandy soils, are deficient in potash. Even soils that were once fertile may now be deficient in various elements because of erosion and leaching, and the fact that they have been cropped without returning mineral and organic matter. In addition to loss of fertility, a considerable percentage of agricultural land has been so badly cut up with gullies that it is difficult, if not impossible, to cultivate. The deserts of Asia and Africa were once fertile land, but, thru continuous cropping and exposure, water and wind swept the soil away. The absence of vegetation on large areas affected the temperature, rainfall, and other climatic conditions.

Soil erosion has greatly increased floods and flood damage. With the disappearance of the topsoil, heavy rainfall is no longer ab-

sorbed, but runs off the land and fills creek and river channels beyond their capacity. Soil moisture and ground water are also affected by soil erosion. The water table is frequently out of reach of plant roots. In many areas in the United States, the ground water has fallen as much as 40 to 60 feet in recent years.

Soil and water conservation are absolutely essential if we are to maintain our needed supply of food and other organic products, and also to keep up the quality of these products. Conservation of soil and water depends almost entirely upon proper management. It consists of controlling erosion, and building and maintaining soil fertility. Erosion is controlled by such cultural practices as will hold rain water where it falls, and by dense vegetative cover of trees and grass. Land that is not used for cultivated crops or pasture should be planted to trees.

Forest and wildlife conservation are important. Both are closely related to soil and water conservation. Forest conservation consists of tree planting and the management and protection of present woodlands. The principal woodland management practices are fire protection, protection against livestock grazing, thinning and improvement cuttings, proper and careful harvesting, and interplanting. Wildlife conservation consists of attracting and increasing the population of song and game birds, game and furbearing animals, and aquatic animals, by providing proper food and shelter. When trees, shrubs, and herbaceous plants are used for gully and roadbank control, species should be selected which provide food for birds and animals, as well as shelter. Rough and wet spots on the farm should be planted to such cover. Certain practices in forest and wildlife conservation are particularly well suited for participation by school children. This is especially true of tree planting and fire protection.

Political Geography

The population and well-being of any nation are dependent upon the resources within its boundaries or those to which it has access. Russia and the American countries are rich in these resources beyond their present population. Their progress and wealth are in proportion to the extent to which they have developed and used their resources. Their future well-being will depend upon how well they manage and conserve this natural wealth. India has maintained its large population largely thru its low standard of living, but it has suffered severely from periodic famines. China and Japan have

kept up their dense population thru low standards of living and the remarkable management of soil and soil moisture, without the use of mineral fertilizers. China has untold mineral wealth which has not yet been developed.

Some small countries like England, Holland, and Belgium have built strong empires and depend for their wealth upon the natural resources of the colonies in their dominion. The present political status of the colonies is largely the result of their natural resources. Tho they are rich in natural wealth, they are influenced, politically and economically, by more aggressive nations. Wherever stronger nations exploit the resources of weaker nations, there is little likelihood of planning and conservation of many of the natural resources.

A few countries have practiced conservation to a limited extent. Germany has managed its forest resources for a long time. Italy and Japan have established extensive soil and water conservation projects with public support. On the steep slopes of many countries, the farmers have established expensive terrace systems, thru necessity, but without national support. In recent years, the United States has awakened to the need for conserving soil and water, but the practices are still far from being used generally. Today many countries are sending representatives to study our soil conservation methods.

INDUSTRIAL, COMMERCIAL AND ECONOMIC GEOGRAPHY

Most countries have a number of natural resources which are important, and occasionally one or more in which they excel. Some countries have many resources. In a few cases, a country has a monopoly on a single resource, and some of these have created a cartel of that resource. The imports and exports of any country are determined by the presence of certain natural resources and the lack of others.

In general, it may be said that the standard of living and national wealth depend upon the natural resources either within the boundaries of a nation or those under its control. Countries which do not have these resources within their borders, but have made economic progress, have done so by setting up industries based on the conversion of natural resources into manufactured or processed products, or they have engaged in the distribution of the raw and finished products thru commerce. At first thought, it would seem that the country which possesses the resources and also processes and manufactures them into finished products would have a great advantage.

However, this is not necessarily true, since national economic welfare depends upon balanced exports and imports. This is also important for international and world welfare. In any case, if the future supply of our natural resources is to be maintained, it will depend upon their conservation and wise use.

Since natural resource planning and conservation are so important, it is necessary that both should be taught in every subject matter area in the present school program. At this point, it should be clear that geography presents unusual opportunities for this purpose.

READING IMPROVEMENT IN GEOGRAPHY FOR RETARDED READERS

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APPRAISAL OF GEOGRAPHIC EVENTS THRU READING

Recent great circle plane flights have served to intensify a war-impelled tendency to think geographically. Since Pearl Harbor concepts of location, time and intimations of crucial natural resources have been loosened from traditional classroom consideration in terms of "product and its source." A fuller appreciation that geographic factors prescribe the basic economic, political and social pattern has been achieved since 1941. Part of our pre-Pearl Harbor lethargy encompassed an unawareness that oceans had shrunk and that "going abroad" had even become just a few meals hence. That a world conflict was instrumental in producing some sparks of geographic enlightenment has, in part, been a reflection upon our pedantic formalism.

With interests whetted almost daily by reports of global shrinkage and frigid zone expeditions, attention can be sustained by improving comprehension in basic geographic factors. Reading can serve as a primary means by which an interpretative, geographic appraisal can be made.

READING IMPROVEMENT PART OF DAILY TEACHING PLAN

When confronted with the prospect of advancing reading as a means to strengthen instruction, many teachers are unwilling to accept the responsibility largely because they consider it an extra

burden. And, since many teachers feel that a vast knowledge of reading mechanics is necessary to build students' reading ability, they shun efforts to improve reading in their daily instructional pattern.

Even tho a student has reached the secondary level, a teacher must not assume that he is equally adept in the reading process. Reading is a skill which develops thruout life according to the material most frequently encountered and the purpose for which that reading is done. Building meaningful reading power is necessary to strengthen general understanding and interpretation of daily events. Even the most ordinary teaching plan should include a genuine effort to improve reading as a part of rather than apart from the instructional liability.

RECOGNIZING THE RETARDED READER

Overlooking now a school-wide program for developmental reading, the purpose here is to consider betterment of those classed as retarded readers. Specifically, what can be done to help an eleventh grade geography class with students who are poor readers and are limited in ambition? By working to eliminate barriers which make reading difficult to them, some improvement in interest can be expected.

A reading deficiency usually reflects several contributory causes. While often difficult to determine, they must be discovered in order that remedial work can be planned. Since each case ordinarily includes a combination of causes, individual treatment is necessary for really effective improvement. What then are some of the causes for retarded readers?[1]

1. Intelligence aptitude
   There is a close relationship between mental aptitude and reading ability. Usually students with average or better intelligence are good readers. Yet as a result of other factors, mentally adept students may be poor readers. Where there is a close approximation in reading and mental ability, as determined objectively by tests, there is no remedial problem. But where a great variance exists between these capacities, a corrective program is in order. The school's most critical reading improvement area lies with those whose mental capacity far exceeds their reading ability and who must be prompted to work up to a level commensurate with that capacity.
2. Physical deficiencies
   a. Defective eyes, ears and speech
   b. Malnutrition

[1] Adapted from Bond, Guy L. and Bond, Eva. *Developmental Reading in High School,* Macmillan 1941. Chap. XI.

3. Emotional disabilities
   a. Personality disorders resulting from improper school placement
4. Limited vocabulary meaning
   a. Sterile social background
   b. Foreign language background
5. Inadequate teaching
   a. Overloaded teaching schedule
   b. Insufficient reading materials
   c. Inexperienced teaching
   d. Ineffective stimulation

Review of these briefly stated determinants of retarded readers indicates that extensive specialist training is not a requisite to detect symptoms of reading retardation. Many daily classroom procedures suffice to point out some ordinary reading problems. Class discussions, occasional student oral reading, interpretation of selected materials, checking test results and particularly the spelling used in essay type quizzes, often offer clues that a reading difficulty exists. Study of available cumulative school records, where a reading problem is suspected, provides some of the pertinent information listed as causatives above.

DIAGNOSIS FOLLOWS ANALYSIS

Following recognition of retarded readers there should be a diagnosis of the individual case based on a synthesis of the symptoms. For the average teacher, untrained in diagnostic work, interpretative clinical study should not be expected. While it is accepted that the end result of diagnosis is determination of a corrective program, these untrained teachers can undertake some remedial measures, individualizing where possible, in the everyday geography reading schedule. A separate remedial program for geography is not likely in the average school because of the expense involved. However, assuming that the most seriously retarded readers are undergoing corrective treatment in a special program and granting that no two retarded readers in the usual classroom situation are alike in degree of difficulty, the problem here concerns the type of reading improvement the average teacher might pursue in daily classwork.

EVERYDAY PLAN FOR RETARDED READERS

Needless to say, geography, like all subjects, has a vocabulary peculiar to its field. Accordingly, enrichment of word usage is a basic step to improve reading comprehension. There are many de-

vices by which the representative language of geography can be learned.

In discussing world affairs, even those not specifically geographic, there are certain words identified with daily events used in common communication channels in which fundamental geographic issues are involved. Random survey of a current daily newspaper's first page presents these words: *open hearth, injunction, Pakistan, "dollar diplomacy," "D.P.'s," Kuomintang.* Even tho the geography teacher may not be "up to that chapter yet," these words, having a geographic foundation in their explanation, cannot be ignored because they are considered to be in the province of the history teacher's current event period.

When new or difficult words are noted by the teacher to be part of the textbook assignment, they should be excerpted and their relationship in the context discussed. Many authors are not too considerate of their student reading public and use terminology which often hinders individual comprehension and interpretation. By selecting such words beforehand, the teacher can help bridge the gap between the author's and the student's experience.

VOCABULARY STUDY CRYSTALLIZES READING COMPREHENSION

Vocabulary study words such as: *sovereignty, race, dehydration, alloy, ensilage, distillation* are part of geographic terminology which appear not only in reading but in conversation quite frequently and often indiscriminately. The meanings of these words should be established to crystallize reading comprehension. Altho these terms may be italicized, which is a teaching aid, there is often additional contextual material which requires explanation for a full understanding. While the dictionary is recognized as a necessary supplement to vocabulary study and drill, the discerning teacher takes time to ascertain that students know how to use this tool for building word growth.

Simply listing words as an assignment with written definitions required is useless. The words, after meaning is established, should be used synonomously in a sentence, in conversation, in context and following the assignment in drill. With a word like *race,* the many uses of that word should be determined to avoid misinterpretation. Often group recognition and explanation of a word such as *paper* or identification of a natural feature such as *archipelago* helps to expand language efficiency.

While retarded readers, especially those who are slow learners,

may be limited in their initial attempts to understand word derivation, teachers who adopt a philological approach to words can develop a fascinating aid to vocabulary growth. Frequent contact with common prefixes, suffixes and word roots not only helps the slow reader to get a vivid interpretation of the words being studied but helps him in subsequent contact with those word parts. Some words commonly used in geography texts which might be used as examples are: *equinox, piedmont, interglacial, multipeopled, automobile, hydroelectric.*

Paragraph Teaching Develops Comprehension

To develop comprehension and build recall, paragraph teaching may be used. Oral reading, by a student or the teacher, of selected paragraphs in the text or supplementary materials is a method frequently tried. This requires that some kind of study guide be prepared beforehand and provided to help students in comprehension. This study aid may be in the form of pertinent questions to focus attention on the main and subordinate thoughts in the paragraph. Or the readers may be asked to summarize the paragraph idea in one brief statement. Individual interpretation of paragraph meaning can be used as a basis for discussion which in turn abets clarification and understanding.

Blanket assignment to outline each paragraph is little more than busy work. Sentence summary does require time because retarded readers are limited in their ability to condense a group of words into a concise statement. But certainly there is an obligation to do a job thoroughly rather than to hurry haphazardly thru a textbook resulting in only a smattering of learning.

Geography—Special Terminology and Pronunciation

Since geography is concerned with concepts of location and time, part of its vocabulary is based on mathematical terms such as: *per cent, scale, proportion, rate* which are used in graphs, maps, diagrams and charts. The daily newspaper, which is the limit of many adults' reading, even tho it be only the sport's or society page, contains material based on these words in which an ability to evaluate should be encouraged. Most geography textbooks have plentiful pictorial and graphic materials using this terminology which should be interpreted.

Many textbooks provide a pronunciation key which students fail

to use largely because its use has not been explained. The few minutes required for this and frequent referral to it can help retarded readers especially to "see" or understand new and difficult words. There are few books which do not have a table of contents or an index yet many students are not practiced in their use. Occasional spot questions requiring use of these for pertinent information or material related to the subject can be profitable.

STIMULATING FREE READING

For the most part the retarded readers, and in particular the slow learners, are the ones who care little for reading now while in school. They will do little what the school considers "good" reading in their post-school days. However, that does not relieve the geography teacher from doing his share to stimulate reading habits by using the subject as a springboard for interest. Yet there is no point in being narrowly pedantic and assume that an independent reading schedule requiring frequent reviews or reports will result in improved taste for books or develop more "acceptable" mature interests in reading.

An outside reading program can certainly be part of the geography course but whatever the scheme an organized, directed plan should be followed. Random reading with little help in selection according to the purpose is hardly fruitful for the energy involved. A program of reading to supplement study of minerals, grains, textiles or countries is excellent provided it is conducted with the same direction that a coach guides his team. But with slow readers and learners, who are ordinarily disinterested readers, the teacher has a big selling job to do as part of his reading improvement program.

PERIODIC APPRAISAL OF DEVELOPMENT NECESSARY

A valid program for reading improvement for retarded readers should naturally use good teaching techniques. An important part of this instructional plan should include periodic appraisal of reading development. Tests requiring ability to locate information in the textbook by using the table of contents, the index; or getting supplementary material by using libarary facilities such as the encyclopedia, the card catalog; or finding meanings by using the dictionary; or checking comprehension by means of tests, either teacher-made or standardized, are simply ways that progress can be

measured and future developmental plans determined. Many teachers consider that building up a rapid reading rate in students is the major purpose for reading improvement instruction. By helping the retarded reader to become an effective reader, the teacher can build reading speed. Developing efficient reading habits is one way to reduce obstacles blocking good study habits and can help lessen limited interest.

Despite the quantities of newsreels, films, pictures, maps, diagrams and other well prepared visual materials presented in recent years, the average American has many gross geographic misconceptions. Some of this is traceable to ineffective utilization of available reading materials to interpret and test explanations offered in printed or oral form. Geography teachers can share in the responsibility to improve the important interrelationship of words and experience.

THE NATIONAL COUNCIL AT WORK

During the past several years it has become increasingly apparent that the efficient administration of Council affairs calls for a systematic program continuously operative day by day thruout the year and progressively functional from one administration to the next. To meet this challenging issue a planning program was inaugurated under last year's President, Mrs. Katheryne T. Whittemore. The program is in the hands of the Planning Committee whose function it is "to survey the present and prospective program of the National Council and to report to the Executive Board thereon prior to the next annual meeting." The Executive Board elected the following persons to serve on this committee: Mrs. Katheryne T. Whittemore, Mr. Tom Barton, and Miss Alice Foster.

The Planning Committee does not supplant but supplements the functions of the Executive Board. Its purpose is to act as an overall steering committee to analyze the functions and problems of the Council and to explore the possibilities of rendering increased services to its members. Before plans can be put into operation they must be approved by the Executive Board either by mail or at the Board meeting. The work of the Planning Committee should materially relieve the congested agenda normally experienced at the annual Board meeting.

Plans submitted by the Planning Committee concern both short term and long term programs. There are those which need immediate attention and can be resolved quickly. Other projects more involved or demanding continuous consideration may require one or several years or even an indefinite period of time.

In practice, the projects outlined by the Planning Committee and approved by the Board will be carried out by special committees appointed by the administration. Contemplated projects cover a wide range of interests and services, as, for example: subjects dealing with the broad implications and applications of geography in diversified fields; curriculum patterns, practices, and materials; bibliographies of general and special types; textbook, workbook, and visual aid materials; field trips and other out-of-doors facilities; standardized tests, standards of teacher preparation and certification; unit teaching or study outlines; etc.

The chairman of the Planning Committee, Mrs. Whittemore, has already submitted a detailed provisional outline of project topics of which the following are representative.

The Study of the Character of Geography that might best result in World Understanding.

A Study of how Geography can be made more functional in Everyday Life.

A Survey of Present Curriculum Patterns and Trends.

Preparation of Loan Packets of Curriculum Materials.

A Survey of the Present Curriculum Practice in Secondary School Geography.

Formulation of High School Curriculum in Geography.

Preparation and Compilation of Materials on High School Geography.

A Compilation of Suggestions and Bibliography for Use by Curriculum Committees.

Studies of the Vertical Integration of the Curriculum.

A Survey of the Place and Character of Geography in General Education Programs.

A Bibliography on Recreatory Reading.

Study of Textbook and Workbook Materials.

The Planning Program here projected affords an opportunity for every member of the Council to make his own specific contribution. The chairman of the Planning Committee welcomes suggestions which will aid the promotion of its work. In fact, it is virtually necessary that members of the Council directly participate in the planning activities of the Council if the work of the Committee is to be completely successful.

May we count upon each member of the Council to support this worthy program.

ALFRED H. MEYER, *President*

EDITORIAL NOTES AND NEWS

The Geography Club of Western Pennsylvania held its regular winter dinner meeting on February 22 at the Congress of Clubs in downtown Pittsburgh. The more than 66 members present heard addresses by Dr. John Clark, Associate Curator of Invertebrate Paleontology and Geology at the Carnegie Museum, and Miss Mary Graves, Educational Specialist for Rand McNally Company. Under the title, "Thru the Backdoors of China," Dr. Clark presented a most interesting and instructive series of personal experiences based on his observations during his recent military service in the southern and western part of that country. Miss Graves discussed "Geography Readiness." The spring meeting was scheduled for April 12, 1947, in Pittsburgh. The main speaker was Dr. Augustin E. Lombard, noted Swiss Geologist, who spoke on some aspects of the geography and geology of Switzerland. In addition papers on geography in education were presented by members of the Club. The officers of the Club are President, Dr. J. Warren Nystrom, University of Pittsburgh; Vice-president, Miss Lavinia Henderson of the Pittsburgh schools; Secretary, Miss Sarah Butz of the McKeesport Schools; and Treasurer, Miss Elizabeth Glass of the Penn Township Schools. The Club publishes a bulletin twice a year, in April and October, with Miss Zoe Thralls, University of Pittsburgh, the editor.

VILHJALMUR STEFANSSON was scheduled to speak on The Soviet Arctic at the spring meeting of the Geography Section of the New York Society for the Experimental Study of Education, according to an advance notice by David J. Swartz, Chairman of the Section. Dr. Swartz has been very active in getting proper recognition and placement of geography in the curriculum of the high schools of New York City. If interested in his views on this matter write him for a mimeographed copy of the March 14, 1947, issue of *The Geography Teacher*, the official organ of the Section. The title of his article in this issue is "High School Students Need Geography."

Diamond exploitation in Angola has produced some of the world's finest quality gem stones. Production is centered in the Lunda region which is in northeastern Angola. At present, exclusive mining rights are granted to a company commonly known as Diamang. Between 1917-1945, this company has produced about eleven and a quarter million carats of diamonds. Diamang's entire production is marketed thru the Diamond Trading Company, which in normal times controls the sale of about 95 per cent of the world output. Known reserves in the Lunda area are expected to guarantee production for the next 25 years. About 80 per cent of Diamang is owned by Portuguese interests, with the remainder owned by Belgian, British, and American interests. Few industrial stones are found, practically all being of gem stone quality, either colorless or of varied pale shades. Open pit mining is used.

The first post-war meeting of the New York State Geographical Association was reported to be held in May at Syracuse University. The principal speaker scheduled for the meeting was Professor Charles B. Fawcett of the University of London.

DR. THOMAS F. BARTON, for many years located at Southern Illinois Normal University, has accepted an appointment as Associate Professor of Geography at the University of Indiana.

All teachers should be concerned with conservation of our natural resources. Hence teachers will be interested in the "Friends of the Land," a national organization of

private citizens devoted to the conservation of our most vital resource, namely, land. They are also interested in every other form of conservation to some extent. From the standpoint of the teacher the salient thing about this organization is the unusual journal—"The Land." It is a quarterly of hefty size and contains very valuable content for the geography teacher. Address: Friends of the Land, Columbus, Ohio.

The International Geographical Union is to hold its next Congress in Lisbon, Portugal, during September, 1948. The list of topics to be considered deal with cartography, physical geography, biogeography, human and economic geography, colonial geography, the history of the subject, and methodology. Further details may be secured from Professor George B. Cressey of Syracuse University, recently appointed as Chairman of the National Committee of the United States. This committee serves under the Division of Geology and Geography of the National Research Council.

If you are interested in a set of 16 pictures on the history of mail service write to United Air Lines, School and College Service, United Air Lines Building, Chicago 38, Illinois. The set is free.

The Kew Gardens of London, altho somewhat scarred by bombings, continue to be one of England's most popular show places. Last year's attendance totaled more than a million and a half, April registering the greatest attendance. The Gardens are more than a show place. They are a veritable research institution where experiments in plant breeding and plant processing may end in a worldwide distribution of plants of varied values.

Canada's Steep Rock Iron Mines did not quite reach the million-ton production sought for 1946. The company expects to exceed this output in 1947. Rail hauls terminate at the Port Arthur dock from whence lake vessels transport the ore to our steel plants.

If interested in a unit which is a storehouse of ideas and materials to aid high school teachers or club and camp directors, send for a mimeographed copy of The Resource Unit—Developing Interests and Hobbies. It may be secured at small cost from Mrs. Marie C. Graham, State Teachers College, Indiana, Pennsylvania. It includes a discussion of hobbies, a bibliography listing more than 200 references and teaching aids, and more than 50 activities.

DR. SAMUEL N. DICKENS, formerly of the Geography Staff of the University of Minnesota, has been appointed head of the Department of Geology and Geography, University of Oregon. He was special consultant in geography for the Office of Strategic Services in 1945, and head of the department of geography and geology in the Army's Biarritz American University in 1945-46.

A joint session of the Ohio Council of Geography Teachers and the Northeastern Branch of the Ohio Council was held in May at Western Reserve University, Cleveland. The following program was presented: The Grand Duchy of Luxembourg, Dr. Ralph Olson; Map Changes Resulting from Recent European Treaties, Dr. Carl Mapes; Physiographic Drawing in the Classroom, Dr. Guy-Harold Smith. Following the luncheon, a field trip to the Cleveland Flats industrial district was conducted by Miss Villa B. Smith. At the business meeting, following a discussion of the changes in the Constitution of the National Council, it was agreed to continue as the Ohio Council. There

is, therefore, no longer a Northeastern Branch of the Ohio Council. The former officers of the Branch continue as officers for the Council and are as follows: President, Hallock F. Raup, Kent State University; Vice-president, Ralph E. Olson, Western Reserve University; and Secretary-Treasurer, Ann Berich, Youngstown, Ohio.

The Illinois Council of Geography Teachers met last May at Peoria and voted to become affiliated with the National Council of Geography Teachers. Dr. Alden Cutshall, University of Illinois, was elected president and Ruby M. Harris, Eastern Illinois State Teachers College, secretary-treasurer. Dr. H. O. Lathrop, Illinois State Normal University, was elected State Coordinator, and Flemin Cox of Carbondale was appointed editor of the Illinois *Bulletin*.

J. GRANVILLE JENSEN, professor of geography at Oregon State College, writes that a Geography Conference is to be held on the Oregon State Campus on October 4, 1947. The theme of the meeting deals with regional planning, teaching problems, the climatic factor, and implications of geography in world affairs. It is hoped that the meeting will be attended by any person interested in geography. A small registration fee will be charged. Provisions are made for a luncheon and dinner hour.

M. MELVINA SVEC, formerly at Buffalo, New York, has accepted appointment at the New York State College for Teachers at Oswego. She takes over the work of Isabelle K. Hart who is retiring.

DR. FLOYD F. CUNNINGHAM, for many years at Florence, Alabama, becomes Professor of Geography at Southern Illinois University at Carbondale.

GEOGRAPHICAL PUBLICATIONS

Cleveland Rodgers. **American Planning, Past-Present-Future.** 290 pp., index. Harper & Brothers, New York and London, 1947. $3.00.

Librarians will meet with difficulty in classifying this book. A temporary solution would be to place it under "Recent Accessions" and await the Library of Congress card.

Planning, observes the author, is a big subject. Possibly a new point of view, permitting a broader perspective, would simplify some problems that now appear confusing and almost insoluble. To secure freshness of view and a measure of simplification, a youthful aviator is brought into being. Perhaps thru his eyes, from high altitudes, the reader can see the basic pattern of America and come to a preliminary understanding of it. At first, it is said, "We want to see as much of it as possible—to see it primarily as land and water, mountains and valleys, rock and soil and trees; as it appeared to the first explorers and settlers before they did anything to it."

The opening chapters seek to carry out this objective. In "Notes Made in the Stratosphere," fleeting glimpses of eastern North America are presented, interspersed with the more or less vagrant thoughts of the eager-to-learn, if occasionally misinformed, aviator. The flier's navigational skill, unfortunately, is not always matched by an ability to grasp the American pattern, and his reflections en route all too often have little bearing upon the main theme.

The overview completed, the reader is supposedly prepared for a dip into history in chapters entitled "Where American History Started," and "Colonial America from the Air." The flight route cannot be expected to jibe with chronology, but no matter. Time collapses at these altitudes; in a moment one passes from the confusing present to the presumably more simple past. Between Oglethorpe, the planner, and Sherman's March to the Sea is less than half a page; later on, when the plane reaches Carolina, it is found that Sir Walter Raleigh was also a notable planner who practiced "almost modern methods." In these ways the author advances toward the theme of patterns and planning. Among more modern planners mentioned are Henry M. Flagler—"the entire East Coast [Florida] owes more to [him] than to anyone since Ponce de Leon," and Carl Graham Fisher—"The Fisher influence is to be noted all over Florida, even around Palm Beach."

More solid footing is reached in "National Resources and Collective Effort" (Chapter 7) where it is observed that, even with many able planners participating in the formation of the country, "national planning was quite ineffective." Furthermore this was not considered a proper function of the federal government and funds were lacking. Many early plans are said to have failed because of the Negro problem (Chapter 8, "The Price of Prejudice") and in more recent years due to fears that planning is antagonistic to free enterprise. In Chapter 9 the "Evolution of National Planning" is traced thru various presidential administrations down to the Special Senate Committee on Postwar Planning in 1944.

The latter part of the book more clearly relates to the announced objectives than do the discursive opening chapters. The book treats provocatively of an important subject, one well worth exploring. Lack of planning, as well as planning, merit careful consideration; plans that went awry should also find important places. The possibilities for a serious and extended treatment are, indeed, infinite. This one, written for a more popular audience, will serve to stimulate interest in the subject.

University of Minnesota RALPH H. BROWN

Hugh Hammond Bennett. **Elements of Soil Conservation,** McGraw-Hill Book Company, Inc., New York, 1947, pp. 375, list of visual aids and index, $3.20.

This book treats the elements of soil conservation in a clear concise style. It is written primarily for the layman, teacher and pre-college pupil. For these people *Elements of Soil Conservation* is superior to *Soil Conservation* by the same author. The latter text is a classical book intended for experts in the field of conservation, while *Elements of Soil Conservation* is essentially an educational book for the novice.

This book contains, however, more than broad concepts. In it we find general understandings substantiated and adequately illustrated by ample statistical information, pictures, maps, diagrams and other data. Technical information is presented in a "down-to-earth" way with vocabulary and sentences in a readable understandable style.

The organization of the book facilitates its use as an educational tool. Each of the twenty-two short chapters is a unit treatment of one phase of soil conservation. Some of the chapter headings are: Extent of Erosion, Climate and Soil, Erosion, Contouring, Channels and Outlets, Water Spreading and Farm Drainage. Below each chapter heading is a list of the subheadings. This treatment enables the reader to quickly glean an overview of the chapter's content.

A list of questions and a few important references are found at the end of each chapter. The government bulletins chosen to supplement the topics in the text will aid the busy teacher who does not have time to read and make selections from all the government material issued on this subject. The list of visual aids, both films and film strips, is beneficial to the teacher and will help in showing more films in the classroom.

During the spring of 1947, this book was used as a supplementary reader and source book in the senior University High School conservation class of Southern Illinois University and by the practice teachers. Both practice teachers and pupils enjoyed using *Elements of Soil Conservation.* This book should be in our elementary and high school libraries. It is a valuable book for agriculture, biology, conservation, geography, science and social studies teachers of the elementary, secondary, and junior college levels. The book can also be studied by the layman and adult education groups where people are interested in learning about soil conservation.

Indiana University THOMAS F. BARTON

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Mr. Crisler is pursuing his work for his doctorate at Northwestern University and is author of "Cities of Central Missouri," which appeared in *Economic Geography,* January, 1947.

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Miss Shawkey did her graduate work at the University of Pittsburgh and is a teacher of geography in the Aliquippa High School. She is also consultant in geography for the Department of Public Instruction of Pennsylvania.

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Dr. Stratton is Head of the Department of Geography, State Teachers College, River Falls, Wisconsin. Other articles by him will be found in the JOURNAL for April, 1917 and November, 1922. He also contributed an article entitled "The Older Drift of Wisconsin," to *Scientific Monthly,* January, 1943.

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Dr. Blanchard is Professor of Geography, University of Illinois, and co-author of the college text "Economic Geography of Europe." He is a frequent contributor to numerous geographical magazines and is well known to JOURNAL readers.

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Dr. Barton is Associate Professor of Geography, Indiana University. He was formerly located at Southern Illinois University, and is First Vice-president of the National Council of Geography Teachers. During the past summer he served as Visiting Professor at the University of Nebraska. Readers of the JOURNAL are familiar with his many contributions to geographic education.

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Miss Haines is an instructor in the Milne School, New York State College for Teachers, Albany, New York.

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